every three and a half years are the true cause of the pressure changes; and that the varying intensity of solar activity within the sunspot period of eleven years produces an effect on the pressure and circulation of our atmosphere, thus affecting the whole globe meteorologically.

(8) The close correspondence between the epochs of these subsidiary pressure variations and those representing prominence frequency suggests, not only their very close relationship, but that the terrestrial pressure quickly answers to the solar changes, while so far as the work has gone it would appear that rainfall (Fig. 2, Curves A, B, C, D) and snowfall are subsequent effects.

(9) It may be remarked that we have already obtained evidence showing that this short-period variation is not the only one acting, but that the eleven-year and thirty-five-year periods apparently influence the short-period variations. But even this does not explain some anomalies already met with, and should the solar origin of these short-period pressure changes be subsequently confirmed, some of them not constant in all localities will have to be explained: and it is possible we may obtain in this way some new knowledge on the atmospheric circulation.

(10) The period of time included in this survey begins generally with the establishment of the full records of the Indian Meteorological Department in 1875 and extends to 1895, when the regularity of the widened-line phenomena was broken, as stated in a previous communication.

Addendum, dated June 26.

In continuing the above researches we have plotted the percentage frequency of the solar prominences derived from the Italian observations for each 10° of solar latitude N. and S. of the equator.

We find that the epochs of maximum prominence disturbance in the higher latitudes are widely different from those near the equator. The latter are closely associated with the epochs of maximum spotted area, the former occur both N. and S. at intervening times.

We have, then, two sets of strongly marked prominence outbursts occurring at intervals of between three and four years.

Both sets are represented closely in the Indian pressure curves.

Solar Physics Observatory.

THE FIRST MAGNETICIAN.[1]

"THIS booke is not for every rude and unconnynge man to see, but for clerkys and very gentylmen that understand gentylness and scyence."

This quotation from Caxton is prefixed by Prof. Thompson to his notes to the new edition of the "De Magnete."

Most students of electricity know that William Gilbert of Colchester is the father of the sciences of magnetism and electricity. They may have some idea of the extent of his discoveries and the general character of his work, but few who have not seen the celebrated book in which he recorded his results can have really grasped how much Gilbert knew and how thorough and complete were his investigations.

"He practised the experimental method of observation before Bacon wrote about it; his methods and discoveries excited the sneers of Bacon, the praises of Galileo and Kepler."

The book justifies the high claim put forward on its behalf by its latest editor, and the thanks of men of science are due to him and to all who have helped him for enabling them to learn what Gilbert did.

It was a happy thought to found the Gilbert Club, and the members of the club who have the chance of possessing this splendid volume, the outcome of many years of patient research and loving labour, are greatly to be envied.

The club was founded in 1889 to commemorate Gilbert's work and to issue a translation in English; at that date there was none, though one was published in America in 1893 The original edition was issued in 1600, and it was at first hoped that the translation might be ready in time for the tercentenary celebration at Colchester in 1900. This proved impossible, but the work is now complete and the result is admirable.

It will be of interest here to give a brief account of the work itself. Starting with the early history of the loadstone, its power of attracting iron known to the ancients and its property of setting in a definite direction discovered in the tenth or twelfth century, Gilbert in the first book of his treatise sets forth the various fundamental properties of a magnet and of magnetised iron, illustrating them by the experiments now familiar to all, and describing almost in every chapter some new discovery or some important law. He is continually appealing to experiment and accurate observation. "Deplorable is man's ignorance in natural science," he writes, "and modern philosophers like those who dream in darkness need to be aroused and taught the uses of things and how to deal with them, and to be induced to leave the learning sought at leisure from books alone and that is supported only by unrealities of arguments and by conjectures" But Gilbert lived too early; it was more than 200 years before the truth of his maxim was realised.

He was quick to appreciate at their true value the inaccurate observations of some who had gone before him.

"Albertus Magnus writes," we are told, "that a loadstone had been found in his day which with one part drew to itself iron and repelled it with the other end; but Albertus observed the facts badly; for every loadstone attracts with one end iron that has been touched by a loadstone and drives it away with the other."

Among other things, we may note his observation that "a long piece of iron (even though not excited by a magnet) settles itself toward north and south"; but perhaps the greatest discovery in this book is contained in the last chapter, "That the globe of the earth is magnetick and a magnet," our "New and unheard of doctrine about the earth" he calls it. The doctrine is proved by the observations and experiments which are the subject of the rest of the treatise.

Book ii. deals with a number of examples of magnetic attraction, and in chapter ii., "On the magnetic coition, and first on the attraction of amber, or more truly on the attaching of bodies to amber," we find the beginnings of the theory of electricity. "For in other bodies," he writes, "a conspicuous force of attraction manifests itself otherwise than in loadstone; like as in amber, concerning which some things must first be said that it may appear what is that attaching of bodies and how it is different from and foreign to the magnetical actions, those mortals being still ignorant who think that inclination to be an attraction and compare it with the magnetic coitions," and so to illustrate electric actions he invents the straw electroscope. He divides bodies into "electricks," which are electrified by friction and attract light bodies, and "non-electricks," the metals and other conductors as we now call them. The effect of heat and moisture is studied and described, and the distinction between electrical and magnetic attraction fully made out.

With amber or other "electricks," "if indeed either a sheet of paper or a piece of linen be interposed there will be no movement. But a loadstone without friction

[1] "William Gilbert of Colchester, Physician of London, on the Magnet, Magnetic Bodies also, and on the Great Magnet the Earth." Pp. 246. Published in Latin, 1600. Translated and edited for the Gilbert Club, 1900, with notes by Prof. S. P. Thompson, F.R.S.

or heat whether dry or suffused with moisture invites magneticks, even with the most solid bodies interposed, even planks of wood or pretty thick slabs of stone or sheets of metal. A loadstone appeals to magneticks only, towards electricks all things move."

He has no mercy on those who would make a perpetual-motion machine by means of the attraction of a loadstone.

"But they have been little practised in magnetick experiments who forge such things as that. . . . Oh that the gods would at length bring to a miserable end such fictitious, crazy, deformed labours with which the minds of the studious are blinded."

Book iii. is on Direction, the property of the magnet to point north and south. At the outset Gilbert recognises that the compass needle deviates from the true North Pole by an amount which varies at different points on the earth. "But it must be understood," he says, "on the threshold of the argument (before we proceed further) that these pointings of the loadstone or of iron are not perpetually made toward the true poles of the world, do not always seek those fixed and definite points or remain on the line of the true meridian, but usually diverge some distance to the east or west."

The fundamental laws of the magnetisation of iron by contact with another magnet by induction either from a loadstone or in the earth's field are clearly set out. Gilbert knew, too, how to demagnetise a magnet. "Putting the whole iron in the fire," he writes, "blow the fire with the bellows so that it may be all aglow and let it remain a little longer time red hot. When cooled (so, however, that while it is cooling it does not rest in one position) . . . you will see that it has lost the verticity it had acquired from the stone." Verticity is the name given to the property of pointing north and south.

Book iv. deals with "Variation," the angle between the true and magnetic meridian at any point, and though we cannot agree with Gilbert that "the variation is caused by the inequality of the projecting parts of the earth," or that "the variation in any one place is constant," we can admire his skill and resource in utilising the scanty material at his disposal and in devising methods to measure the amount of the variation.

In Book v. the action of a dipping needle is described and explained, while Book vi. treats of the "Globe of the Earth the Great Magnet."

Any notice of this edition of the "De Magnete" would be incomplete without some reference to the notes contributed by the editor.

During the work of revising and editing the English translation of "De Magnete," many points, as Prof. Thompson writes, came up for discussion requiring critical consideration and the examination of the writings of contemporary or earlier authorities. The results of some portion of this labour have been collected in the form of notes. The text has with great judgment been printed just as Gilbert left it; in fact, comparison shows that throughout the English and the original Latin versions run page for page. The notes cover some seventy pages, and are replete with curious and interesting information. Take, for example, that relating to the picture of the blacksmith striking the iron while it lies north and south, given on p. 139, which we have reproduced. It appears that woodcuts containing human figures are rare in the art of the sixteenth century, and Prof. Thompson traces Gilbert's picture to a book of fables by Cornelius van Kiel, published at Cologne in 1594,

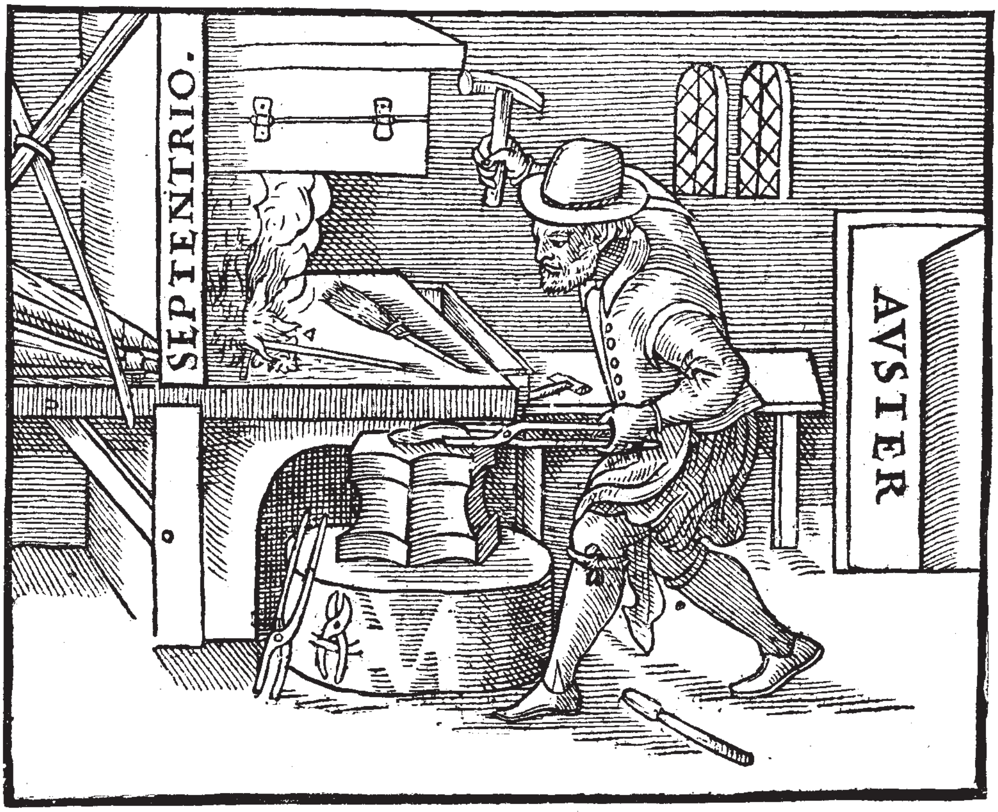

FIG. 1.—The Blacksmith making a Magnet.

where it is used to illustrate a fable of the blacksmith and his dog. The dog has been omitted in the Gilbert picture, the words Septentrio and Auster have been added and some other details modified, but there is no doubt where the picture came from.

Another note of interest is that to p. 165, dealing with the discovery of the mariner's compass, its construction, and the wind-rose or chart of the winds marked on the card of the compass. The earliest known examples of the wind-rose are on certain Venetian charts dating back to 1426 or 1436. Not less interesting is the paper which some five years since Prof. Thompson read before the Bibliographical Society on "Peter Short, Printer, and his Marks." This, however, is not in this volume. Peter Short, the hitherto unknown printer of the book, used as his mark the device of a serpent entwined round a T-shaped support, and the investigation as to why this mark was used has led to an interesting chapter in the history of the printers of the sixteenth century.

But enough has probably been said to convince even an unwilling reader of the value of the book "De Magnete" and of the services which the editor and his colleagues have rendered to science by the issue of this English edition. They are to be congratulated on the results of their labour of love, which, though it has cost them many hours of toil, has had so successful an issue.

R. T. G.

RECENT HISTORY OF THE ROYAL SOCIETY.[1]

WHEN the "Record of the Royal Society" was first issued in 1897, further editions of that interesting compilation were promised, and the Society has considered the opening of the new century an appropriate time for fulfilling that promise. Although there is not much of especial importance in the history of the Society to chronicle during the four years which have elapsed since the issue of the first edition, no one will quarrel with the Council for having taken this opportunity of issuing a work which contains additions of so much interest as does the "Record" before us.

The first edition was noticed in our columns in 1897 (see vol. lvi. p. 343), and the present volume gives us, with but slight modification, the historical material contained in the first edition. The work, however, has extended from a manual of 224 pages to a substantial volume of 427 pages, and this increase in bulk is almost entirely due to the valuable list of the Fellows of the Society elected since its foundation, arranged in chronological order of election, with an alphabetical index.

While the main portion of the contents of the first edition remains unchanged, the short period which has elapsed between the two issues of the "Record" has seen modifications in some old associations of the Society. The Botanic Gardens, Chelsea, formerly known as "The Physick Garden," established in 1721, after enduring various encroachments upon its boundaries and sundry risks of absorption into the maw of the London builder, has found salvation in that essentially modern sanctuary for neglected charities, a scheme of the Charity Commissioners. This garden was granted by Sir Hans Sloane to the Society of Apothecaries in February, 1721, on conditions mentioned in the notice in NATURE already mentioned. In the event of the Society of Apothecaries at any time failing to fulfil these conditions, or converting the garden into buildings for habitations or any other uses save as a physic garden, the premises were to be held in trust for the Royal Society, by which it was to be held under like conditions, the obligations in this case being to the Royal College of Physicians. The Society of Apothecaries appears to have carried out the prescribed terms, but in 1861 evinced a desire to be relieved of its charge, which, however, the Royal Society showed no anxiety to assume, and the garden, suffering in the meantime some curtailment on the building of the Chelsea Embankment, remained under its original tenure until 1898, when the Society of Apothecaries, anxious to be rid of the burden of its maintenance, applied to the Charity Commissioners to draw up a scheme for the administration of the garden. Under this scheme, which was drawn up in consultation with the Council of the Royal Society, the management of the garden is placed in the hands of the trustees of the London Parochial Charities, with a committee of management of seventeen, upon which each of the bodies named in Sir Hans Sloane's original deed, viz. the Society of Apothecaries, the Royal Society and the Royal College of Physicians, has one representative; there are also representatives of certain educational authorities, and nine nominees of the trustees above mentioned. The committee is to provide for the maintenance of botanical specimens of living plants for teaching purposes and for the supply of botanical specimens for external instruction, and may also provide instruction, by means of lectures or otherwise, in botany with especial reference to the requirements of elementary education.

Another and more familiar name has disappeared from the list of institutions carried on under the ægis of the Royal Society. The Kew Observatory, built by King George III. on the site of an old monastery in 1769, for observing the transit of Venus which occurred in that year, was handed over by the Government in 1842 to the British Association, who maintained it until 1871. In that year Mr. J. P. Gassiot, F.R.S., executed a deed of trust for the endowment of the Observatory with a sum of 10,000*l*., the income to be administered by a committee of the Royal Society for the purposes of the Observatory. Such a committee was duly appointed, and assumed control of the Observatory, being subsequently incorporated under the title of the Kew Observatory Committee.

Under the scheme for the establishment of the National Physical Laboratory, the Kew Observatory Committee has been wound up, and the Observatory has become incorporated in the larger institution, of which it forms a department. The conditions of Mr. Gassiot's endowment are, however, observed by the retention, as a body independent of the governing body of the Laboratory, of the Gassiot Committee of the Royal Society, composed of those Fellows of the Society who are members for the time being of the executive committee of the Laboratory.

So much has been written lately in these columns and elsewhere about the National Physical Laboratory that there is no occasion to enlarge upon this subject further than to say that its scheme of management and organisation is set out in full in the volume before us, which also contains the full text of the Gassiot declaration of trust.

Another interesting document published in the "Record" is the royal warrant for the board of visitors of the Royal Observatory, Greenwich, granted by His Gracious Majesty the King on May 23, 1901.

The list of benefactions is extended by the addition of two bequests received since 1897—the bequest of Sir William Mackinnon, who left to the Society the residue of his estate, upon trust, for the foundation and endowment of prizes or scholarships for the special purpose of furthering natural and physical science and of furthering original research and investigation in pathology. The first award under this bequest was made last year to Mr. J. J. R. Macleod, M.B., for researches in pathological chemistry. The other bequest is one made by the late Prof. David Edward Hughes, the income "to be annually awarded either in money or in the form of a

[1] "The Record of the Royal Society of London." Second edition, 1901. Pp. vi + 427. "Year-Book of the Royal Society of London, 1902." Pp. 265. (London: Harrison and Sons.)